Amendments to the Claims

Please amend the Claims as shown below. This listing of Claims replaces all prior versions and listings of the Claims in this application.

Listing of Claims

41. (Previously Presented) A method of making a patterned semiconductor film, comprising the steps of:

a) printing a solution comprising silicon-containing semiconductor nanoparticles having a passivation layer covalently bound thereto selected from the group consisting of an alcohol, an alcoholate, a thiol, a thiolate, an alkyl group, and an aralkyl group, a first cyclic Group IVA compound of the formula (1):

$$(AH_x)_n, \qquad (1)$$

where n is from 3 to 8, each of the n instances of x is independently 1 or 2, and each A in the formula is independently Si or Ge, and a solvent in a pattern on a substrate; and

b) curing said printed pattern to form said patterned semiconductor film.

42-43. (Canceled)

44. (Previously Presented) The method of Claim 41, wherein said silicon-containing semiconductor nanoparticles consist essentially of passivated silicon nanoparticles.

45. (Canceled)

46. (Previously Presented) The method of Claim 41, wherein said curing step comprises sintering said printed pattern to form said patterned semiconductor film.

47-50. (Canceled)

51. (Previously Presented) The method of Claim 41, further comprising selectively irradiating portions of said printed solution, and removing either irradiated or non-irradiated portions of said printed solution to form said pattern.

52. (Canceled)

53. (Original) The method of Claim 51, wherein said selectively irradiating substep comprises (i) positioning at least one of said substrate and a mask such that said portions can be selectively irradiated and said non-irradiated portions cannot be irradiated, and (ii) irradiating said layer with ultraviolet light through said mask.

54. (Original) The method of Claim 53, wherein said printing step further comprises the substep of aligning said mask to an alignment mark on said substrate.

55-57. (Canceled)

58. (Previously Presented) The method of Claim 41, further comprising drying said solution and said substrate.

59. (Previously Presented) The method of Claim 44, wherein said curing step further comprises heating said pattern to a temperature of at least about 200 °C to sinter said passivated silicon nanoparticles in said pattern.

60. (Canceled)

61. (Previously Presented) The method of Claim 41, wherein said curing step further comprises placing said substrate into a chamber, evacuating said chamber, and passing an inert and/or reducing gas into said chamber.

62. (Previously Presented) The method of Claim 41, wherein said pattern comprises lines having a width of from 0.5 to 50 μm.

63. (Original) The method of Claim 62, wherein said lines have an inter-line spacing of from 100 nm to 100 μm.

64. (Previously Presented) The method of Claim 62, wherein said lines have a length of from 2 μm to 2000 μm.

65. (Previously Presented) The method of Claim 62, wherein said lines have a thickness of from 0.01 μm to 500 μm.

66-99. (Canceled)

100. (Previously Presented) The method of Claim 44, wherein said passivated silicon nanoparticles have an average particle diameter of less than 5 nm.

101. (Previously Presented) The method of Claim 44, wherein said passivated silicon nanoparticles have a particle size distribution of from 0.2 nm to less than 10 nm.

102. (Canceled)

103. (Previously Presented) The method of Claim 41, wherein each x in the formula (1) is 2.

104. (Previously Presented) The method of Claim 41, wherein each A in the formula (1) is Si.

105. (Previously Presented) The method of Claim 41, wherein n is 5.

106. (Previously Presented) The method of Claim 103, wherein each A in the formula (1) is Si.

107. (Previously Presented) The method of Claim 103, wherein n is 5.

108. (Previously presented) The method of Claim 106, wherein n is 5.

109. (Previously Presented) The method of Claim 41, wherein the solution consists essentially of said passivated silicon-containing semiconductor nanoparticles, said first cyclic Group IVA compound and said solvent.

110. (Previously Presented) The method of Claim 44, wherein the solution consists essentially of said passivated silicon nanoparticles, said first cyclic Group IVA compound, and said solvent.

111. (Previously Presented) The method of Claim 165, wherein p is 0 or 1, q is at least 1, (z - y) is 0, and Z is B or P.

112. (Previously Presented) The method of Claim 111, wherein R' in the formula (2) is alkyl.

113. (Previously Presented) The method of Claim 41, wherein said solution further comprises a compound of the formula $(ZH_uR_{3-u})_k$, where Z is selected from the group consisting of B, P and As, u is an integer of from 0 to 3, k is 1 or 2, and each R is independently alkyl, $BH_sR"_{2-s}$, $PH_sR"_{2-s}$, $AsH_sR"_{2-s}$ or $AH_tR"_{3-t}$, where s is 0 to 2, t is 0 to 3, and R" is alkyl or AH_3.

114. (Previously Presented) The method of Claim 113, wherein R in the formula $(ZH_uR_{3-u})_k$ is H or AH_3, where A is Si or Ge.

115. (Previously Presented) The method of Claim 113, wherein u is 0 or 3.

116. (Previously Presented) The method of Claim 41, wherein said first cyclic Group IVA compound is present in said solution in a percentage by weight of from 0.1% to 50%.

117. (Previously Presented) The method of Claim 165, wherein said silicon-containing semiconductor nanoparticles, said first cyclic Group IVA compound and said second

cyclic Group IVA compound are present in said ink in a percentage by weight of from 0.1% to 50%.

118. (Previously Presented) The method of Claim 41, wherein said solvent is aprotic.

119. (Previously Presented) The method of Claim 41, wherein said solvent is apolar.

120. (Canceled)

121. (Previously Presented) The method of Claim 118, wherein said solvent has a boiling point of less than 250 °C at atmospheric pressure.

122. (Previously Presented) The method of Claim 121, wherein said solvent has a boiling point of less than 150 °C at atmospheric pressure.

123. (Previously Presented) The method of Claim 118, wherein said solvent is selected from the group consisting of alkanes, arenes, and cycloalkanes.

124. (Previously Presented) The method of Claim 41, wherein said solution further comprises one or more additives selected from the group consisting of a tension reducing agent, a surfactant, a thickening agent, and a binder.

125. (Previously Presented) The method of Claim 59, wherein said sintering temperature is at least about 300 °C.

126. (Canceled)

127. (Canceled)

128. (Previously Presented) The method of Claim 41, wherein said printing step comprises inkjet printing, gravure printing, offset lithography, or flexographic printing said solution in said pattern onto said substrate.

129-135. (Canceled)

136. (Previously Presented) The method of Claim 100, wherein the silicon nanoparticles have an average diameter of less than 3.5 nm.

137. (Previously Presented) The method of Claim 44, wherein the silicon nanoparticles have a size distribution range such that at least 95% of the nanoparticles have an average particle diameter of from 0.1 nm to 10 nm.

138. (Previously Presented) The method of Claim 137, wherein the silicon nanoparticles have a size distribution range such that at least 98% of the nanoparticles have an average particle diameter from 0.5 nm to less than 5 nm.

139. (Previously Presented) The method of Claim 116, wherein the first cyclic Group IVA compound is present in the solution in a percentage by weight of from 0.5 to 30 wt.% .

140. (Previously Presented) The method of Claim 139, wherein the first cyclic Group IVA compound is present in the solution in a percentage by weight of from 1.0 to 20 wt.%.

141. (Previously Presented) The method of Claim 117, wherein the silicon-containing semiconductor nanoparticles and first and/or second cyclic Group IVA compound(s) are present in the solution in a percentage by weight of from 0.5 to 30 wt.%.

142. (Previously Presented) The method of Claim 117, wherein the silicon-containing semiconductor nanoparticles and the first and/or second cyclic Group IVA compounds are present in a weight ratio of from 0.1% to 90%.

143. (Previously Presented) The method of Claim 142, wherein the silicon-containing semiconductor nanoparticles and the first and/or second cyclic Group IVA compounds are present in a weight ratio of from 10% to 50%.

144. (Previously Presented) The method of Claim 41, wherein the solvent has a gas-phase dipole moment of about 2 debyes or less.

145. (Previously Presented) The method of Claim 144, wherein the solvent has a boiling point of about or less than 250 °C at atmospheric pressure.

146. (Previously Presented) The method of Claim 41, wherein the solvent has a gas-phase dipole moment of about 0.5 debye or less.

147. (Previously Presented) The method of Claim 146, wherein the solvent has a boiling point of about or less than 150 °C at atmospheric pressure.

148. (Canceled)

149. (Previously Presented) The method of Claim 124, wherein the one or more additives are present in the solution in an amount of from 0.1 wt.% to 5 wt.%.

150. (Previously Presented) The method of Claim 41, wherein the substrate comprises a semiconductor wafer or a transparent or translucent display window with a two-dimensional array of fields thereon.

151. (Canceled)

152. (Previously Presented) The method of Claim 41, wherein the substrate comprises a glass or plastic window.

153-154. (Canceled)

155. (Previously Presented) The method of Claim 41, further comprising removing said solvent from the printed solution prior to curing.

156. (Previously Presented) The method of Claim 59, wherein said sintering temperature is at least 400 °C.

157. (Previously Presented) The method of Claim 41, further comprising cleaning the substrate with the patterned semiconductor film thereon.

158. (Previously Presented) The method of Claim 157, wherein cleaning comprises rinsing the substrate with or immersing the substrate in a cleaning solvent, draining the cleaning solvent from the substrate, and drying the substrate and patterned semiconductor thin film.

159. (Previously Presented) The method of Claim 157, wherein the cleaning solvent comprises a solvent in which the first cyclic Group IVA compound and/or said silicon-containing semiconductor nanoparticles are substantially soluble.

160. (Previously Presented) The method of Claim 62, wherein said lines have a width of from 1 μm to 20 μm.

161. (Previously Presented) The method of Claim 63, wherein said inter-line spacing is from 200 nm to 50 μm.

162. (Previously Presented) The method of Claim 161, wherein said inter-line spacing is from 500 nm to 10 μm.

163. (Previously Presented) The method of Claim 64, wherein said lines have a length of from 5 μm to 1000 μm.

164. (Previously Presented) The method of Claim 65, wherein said lines have a thickness of from 0.05 μm to 250 μm.

165. (Previously Presented) The method of Claim 41, wherein said solution further comprises a second cyclic Group IVA compound of the formula (2):

$$(AH_x)_m(AH_yR_{z-y})_p(ZR')_q,$$

where (m + p + q) is from 3 to 12, each of the m instances of x is independently 0, 1 or 2, each of the p instances of y is independently 0, 1 or 2, each of the p instances of z is independently 0, 1 or 2, each of the p instances of (y + z) is independently 1 or 2, each of the q instances of w is independently 0 or 1, at least one of p and q is at least 1, each A in the formula (2) is independently Si or Ge, Z is selected from the group consisting of B, P and As, R' is R or H, and each R in the formula (2) is independently alkyl, $BH_sR"_{2-s}$, $PH_sR"_{2-s}$, $AsH_sR"_{2-s}$ or $AH_tR"_{3-t}$, where s is 0 to 2, t is 0 to 3, and R" is alkyl or AH_3.

166-203. (Canceled)

204. (Previously Presented) The method of claim 41, further comprising irradiating said pattern after said printing and prior to said curing said printed pattern.

205. (Canceled)

206. (Previously Presented) The method of Claim 41, wherein said silicon-containing semiconductor nanoparticles further comprise a dopant.

207-210. (Canceled)

211. (Currently Amended) A method of making a patterned semiconductor film, comprising the steps of:

a) printing a solution comprising passivated semiconductor nanoparticles <u>comprising a dopant</u>, a first cyclic Group IVA compound of the formula (1):

$$(AH_x)_n, \qquad (1)$$

where n is from 3 to 8, each of the n instances of x is independently 1 or 2, and each A in the formula is independently Si or Ge, and a solvent in a pattern on a substrate, wherein said pattern comprises one or more lines having a width of not more than 100 μm, a length of not more than 5000 μm, a thickness of not more than 1000 μm, and an inter-line spacing of not more than 100 μm; and

b) curing said printed pattern to form said patterned semiconductor film.

212. (Previously Presented) The method of Claim 211, wherein said curing step comprises heating said pattern to a temperature of at least about 200 °C to sinter said passivated semiconductor nanoparticles in said pattern.

213. (Previously Presented) The method of Claim 211, wherein said passivated semiconductor nanoparticles consist essentially of silicon nanoparticles and a passivation layer thereon.

214. (Previously Presented) The method of Claim 213, wherein said passivation layer comprises at least one member selected from the group consisting of an alcohol, an alcoholate, a thiol, a thiolate, hydrogen, an alkyl group, an aryl group, and an aralkyl group.

215. (Previously Presented) The method of Claim 211, wherein said passivated semiconductor nanoparticles have an average particle diameter of less than 5 nm.

216. (Previously Presented) The method of Claim 211, wherein said passivated semiconductor nanoparticles have a particle size distribution of from 0.2 nm to less than 10 nm.

217. (Previously Presented) The method of Claim 211, wherein A is Si.

218. (Previously Presented) The method of Claim 217, wherein each x is 2.

219. (Previously Presented) The method of Claim 218, wherein n is 5.

220. (Previously Presented) The method of Claim 211, wherein said first cyclic Group IVA compound is present in said solution in a percentage by weight of from 0.1% to 50%.

221. (Previously Presented) The method of Claim 211, wherein the solution consists essentially of said passivated semiconductor nanoparticles, said first cyclic Group IVA compound and said solvent.

222. (Previously Presented) The method of Claim 211, wherein the substrate comprises a transparent or translucent display window with a two-dimensional array of fields thereon.

223. (Previously Presented) The method of Claim 211, further comprising removing the solvent from the printed solution prior to curing.

224. (Previously Presented) The method of Claim 211, further comprising irradiating said pattern after said printing and prior to said curing said printed pattern.

225. (Previously Presented) The method of Claim 211, wherein said printing step comprises inkjet printing, gravure printing, offset lithography, or flexographic printing said solution in said pattern onto said substrate.

226-230. (Canceled)

231. (Previously Presented) The method of Claim 41, wherein said printing step is conducted in an inert and/or reducing atmosphere.

232. (Canceled)

233. (Previously Presented) The method of Claim 211, wherein said printing step is conducted in an inert and/or reducing atmosphere.

234. (Canceled)

235. (Canceled)